Abstract

A method and structure for forming deep trenches in a semiconductor substrate is provided. The method comprises: providing a semiconductor substrate; forming a pad oxide layer on the semiconductor substrate; forming a pad nitride layer on the pad oxide layer; forming a borophosphosilicate glass layer on the pad nitride layer; forming a borosilicate glass layer on the borophosphosilicate glass layer; and forming deep trenches through the borosilicate glass layer, through the borophosphosilicate glass layer, through the pad nitride, through the pad oxide, and into the semiconductor substrate. The borosilicate glass layer and the borophosphosilicate glass layer function as a composite hard mask in forming the deep trenches. With the borophosphosilicate glass layer, the composite hard mask can be easily removed by dry etch process using hydrogen fluoride vapor after the deep trenches have been formed.